MEMORANDUM

SUBJECT: Review of Revised Work Plan "Additional Data Collection at the Former Bulk Chemical Storage Area - John F. Queeny Plant St. Louis, Missouri" dated February 2004

FROM: Randy Rohrman, Hydrogeologist
ARTD/RCAP

TO: Stephanie Doolan, Project Officer
ARTD/RCAP

As requested, I have reviewed the revised work plan "Additional Data Collection at the Former Bulk Chemical Storage Area - John F. Queeny Plant, St. Louis, Missouri" dated February 2004, along with Solutia's responses to the U.S. Environmental Protection Agency (USEPA) comments that were sent to Solutia on December 29, 2003. The purpose of this review was to determine whether the revised document adequately addressed the comments that I previously provided upon review of the original work plan.

I determined that there were two (2) comments that remain unresolved. These comments are procedural/equipment issues that should be easily and quickly resolved. For ease of review, I have identified them as they appear in Solutia's responses which were enclosed with a letter received by the USEPA on February 9, 2004.

Page 5, Comment 9a

The original USEPA comment requested a more detailed methodology for assessing light, non-aqueous phase liquids (LNAPLs). The response included a proposal to use a bottom-filling bailer to visually assess the presence and collect a sample of LNAPL. A bottom-filling bailer is not recommended for use in detecting and sampling floating product (LNAPL). Bottom-filling bailers collect samples through a ball-check controlled inlet valve located at the bottom of the bailer. The ball is composed of a material that is denser than water so that once the bailer is filled, the ball will sink and close the inlet, thus preventing the water from flowing back through the inlet as the bailer is retrieved from the well. As a bottom-filling bailer is lowered down to the water surface the ball rests against the inlet, and as the bailer is lowered through the surface of the water the ball will continue to rest against the inlet until sufficient hydrostatic pressure lifts the ball off of the inlet and allows water to flow into the bailer. Although it varies depending on the density (composition) of the ball, in most cases the inlet of the bailer must be submerged several inches below the surface of the water before there is sufficient hydrostatic pressure to lift the ball off of the inlet and allow water to flow freely into the bailer.

A problem occurs when using a bottom-filling bailer to collect a sample of a floating layer of LNAPL when the thickness of the LNAPL is less than the submergence needed to lift the ball and allow fluid to flow into the bailer. In this instance, the ball rests against the inlet as it passes completely through the LNAPL, and when it is submerged enough to lift off the inlet only water beneath the LNAPL enters the bailer. If the bailer is then lowered further so that it is entirely below the LNAPL layer it will become completely filled with water, and when it is pulled back up through the LNAPL the floating material will flow off the surface of the water in the bailer and will be lost. A bottom-filling bailer is effective in collecting a sample of LNAPL only in those cases where the thickness of the layer of floating product is greater than the submergence needed to lift the ball and open the inlet.

A top-filling bailer, combined with proper technique, is a very effective device for collecting thin layers of floating product, even when the product exists as only a "sheen" on the water surface. A true top-filling bailer is constructed so that fluid can only enter through the top, and fills the same way as submerging an empty water glass, held right side up, in a large container of water; it essentially fills by "skimming" the surface. The bailer must be constructed in order to effect submergence, either through the material the bailer is constructed of or by attaching sufficient weight to it. The technique for using a top-filling bailer to collect thin LNAPL layers involves lowering the bailer very slowly until it begins to fill by skimming the surface, and then retrieving it before it completely fills, thereby ensuring that the LNAPL, even if it exists as only a "sheen", is not lost. A very effective technique to monitor the filling of the bailer is to place an electronic water level indicator probe inside the bailer at a position that will indicate when the bailer is approximately half-filled. After properly positioning the probe within the bailer, the cable for the water level indicator can then be secured to the bailer cord using plastic ties in order to hold the probe in place within the bailer. During sampling, the bailer can be raised to quickly stop the skimming process as soon as the water level indicator signals that the bailer is half-filled, thus ensuring that any skimmed floating product will remain within the bailer. After retrieving the bailer, the contents are poured into a glass beaker to allow visual inspection for free product. If free product is observed, the two-phase water/LNAPL sample should be appropriately containerized and submitted for laboratory analysis. The laboratory should be instructed to analyze the non-aqueous phase of the two-phase sample.

Please revise the procedure for visually assessing and sampling LNAPL to utilize a top-filling bailer with a procedure similar to the one described above.

<u>Page 5, Comment 10a</u>

The original USEPA comment requested a more detailed methodology for assessing dense, non-aqueous phase liquids (DNAPLs). The response included a proposal to use a bottom-filling bailer to visually assess the presence of DNAPL and collect a sample. A bottom-filling bailer is not recommended for use in detecting and sampling DNAPL. The problem with using a bottom-filling bailer is that the bailer will fill with water as it is lowered through the water column, and once filled the ball-check will close off the inlet of the bailer. When the bailer reaches the bottom of the well, whether any DNAPL present will then enter the bailer will be dependent upon whether there is a sufficient thickness of DNAPL of sufficent density to overcome the density of the ball-check in order to lift it off the inlet and allow the DNAPL to enter the bailer by displacing the water.

Another problem that can occur using a bottom-filling bailer is when the DNAPL has a greater density than the ball-check. When this is the case, even if there is a significant thickness of DNAPL such as a one-foot thick layer, because the ball-check is less dense than the DNAPL it will float on the surface of the DNAPL and not sink to close the inlet. Then as the bailer is pulled back up through the water column the DNAPL will run back out of the bottom of the bailer and be lost.

Several devices are recommended for collecting DNAPL from a monitoring well. These include (1) a point-source double check valve bailer, (2) a discrete (syringe) sampler that can be controlled from the surface and made to fill once the sampler has reached the bottom of the well, or (3) use of a peristaltic pump if the depth to the water table is shallow enough for suction-lift pumping. If free product is retrieved, the two-phase water/DNAPL sample should be appropriately containerized and submitted for laboratory analysis. The laboratory should be instructed to analyze the non-aqueous phase of the two-phase sample.

Please revise the procedure for visually assessing and sampling DNAPL.

If there are any questions regarding this memorandum, please contact Randy Rohrman at extension 7543.